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A NEW SPECIES OF *AUSTROTINODES* (TRICHOPTERA: ECNOMIDAE) FROM TEXAS

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Abstract.—*Austrotinodes texensis,* new species, from the Edwards Plateau region of Texas, is described and illustrated. The new species appears most closely related to *Austrotinodes sedmani* Flint from Central America, but differs primarily in the aedeagus having only two pairs of lateral processes and in the shape of the intermediate appendages. The genus now is represented in North America by five species. A checklist of the 34 known species of *Austrotinodes* and their distributions is presented.

The genus *Austrotinodes* Schmid previously consisted of 33 species that are distributed primarily in Mexico and southward throughout Central and South America (Schmid, 1955; Flint, 1973; Flint and Denning, 1989; Muñoz and Holzenthal, 1993). However, Waltz and McCafferty (1983) reported finding an unidentified *Austrotinodes* larva from central Texas. Recent collections of caddisflies from Texas yielded adult and immature specimens of *Austrotinodes* that represent an undescribed species. Herein, the new species is described and illustrated. Terminology follows Flint and Denning (1989). Type specimens are deposited in the California Academy of Science (CAS), Florida State Collection of Arthropods (FSCA), Illinois Natural History Survey (INHS), National Museum of Natural History (NMNH), Texas A & M University Entomology Collection (TAMU), University of Minnesota Insect Collection (UMSP), University of North Texas Insect Collection (UNT), and the Royal Ontario Museum (ROM). All material is stored in 70% ethanol.

Austrotinodes texensis, new species
Figs. 1–16

Male. Figs. 1–4. Forewing 4.5 mm, hindwing 4.0 mm. Wings brown with patches of fine, light brown setae near costal margin. Abdomen tan with brown sclerites. Legs and thoracic sclerites light brown. Head brown with dark brown setae, antennae cream-white. *Genitalia.* Segment IX deeply divided with sternum elongated; in ventral view, approximately 2 times as long as wide, with lateral margins sinuate; in lateral view, broad preapically. Inferior appendages robust, fused mesally, with prominent mesal emargination in ventral view. Phallic guide darkly sclerotized, strongly arched, tip blunt. Intermediate appendages long and narrow throughout length in lateral view, but each with prominent, rounded mesal arch at mid-length in dorsal view, distal half divergent, bearing three stout apical setae. Tergum X divided into pair of semi-membranous oval lobes lying between bases of preanal appendages. Preanal appendages long, tapering apically, apex rounded, margins crenulated, surface setose. Aedeagus sclerotized basally and membranous apically; bearing two

pairs of processes originating dorso-laterally, tips of processes convergent in dorsal view.

Female. Fig. 5. Forewing 5.5 mm, hindwing 5.0 mm. Coloration as in male. *Genitalia.* Eighth segment with sternum prolonged posteriad gradually tapering to broad point, about 1.5 times long as wide. Ninth segment greatly prolonged, narrow, compressed tube bearing setae. Tenth segment elongate, narrow, with three pairs of apical papillae.

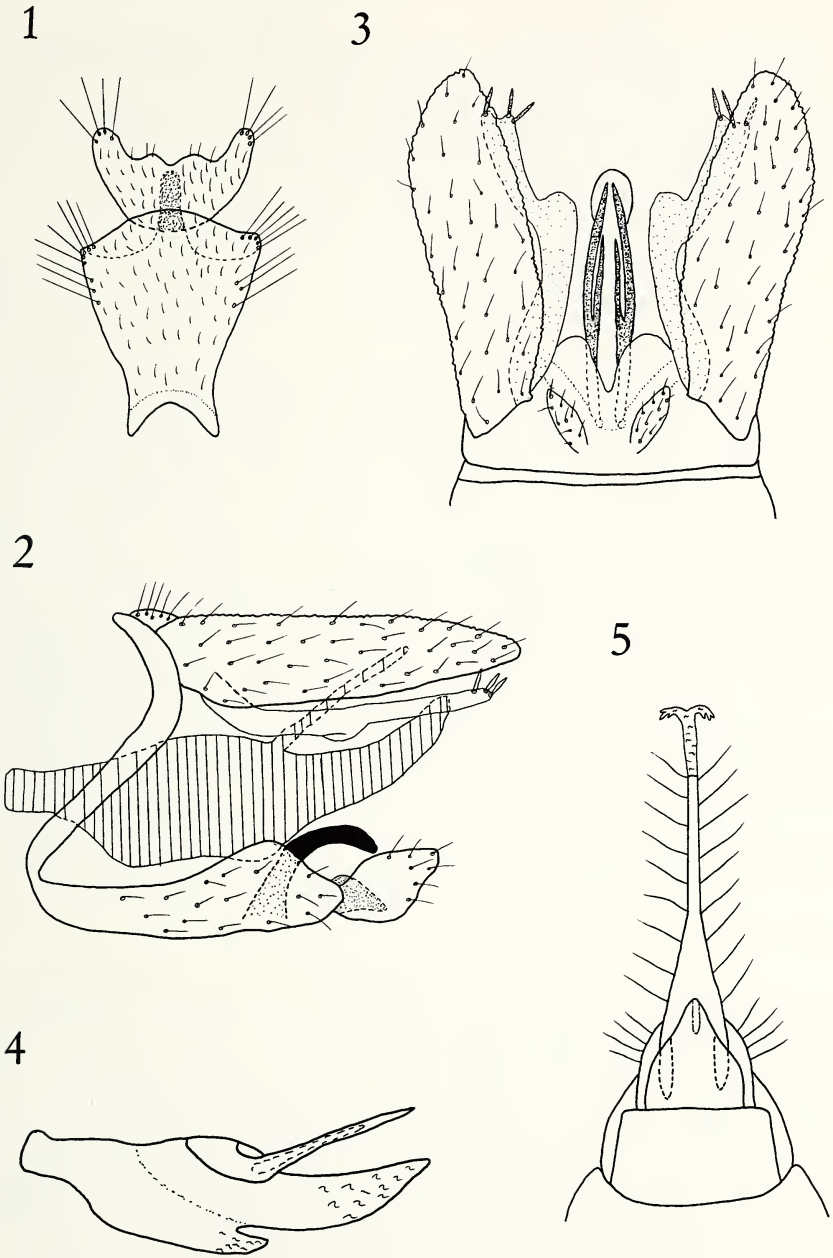
Pupa. (female, genitalia visible). Figs. 6–8. Length 6.1 mm. Mandibles elongate, curved, without serrations. Labrum semicircular; with four setae laterally on anterior margin and three long setae laterally on each side of basal section. Antennal scapes each with two long setae; antennae extending to abdominal segment VII. Tarsus of each metathoracic leg with dense fringe of hairs. Wing pads reaching fifth abdominal segment. Abdominal segments each bearing four pairs of setae dorsally (three pairs posteriorly, one pair anteriorly) that become increasingly longer toward eighth segment; segments II–VIII bearing four setae laterally. Hook plates present anteriorly on segments II–VIII, segment V with both anterior and posterior hook plates. Apical process a small lobe bearing several long setae.

Larva. Figs. 9–16. Length 7.0 mm. Head, pronotum and forelegs reddish-brown; mesonotum and metanotum and hindlegs yellow; abdomen whitish. Head elongate and depressed, nearly two-thirds the length of the thorax, broadest posteriorly; with a prominent ventro-lateral carina from eyes posteriorly; with only primary setae. Frontoclypeus elongate and parallel-sided, with anterior margin nearly straight, Labrum sclerotized, lacking secondary setae or brushes; inner surface with a row of prominent, basally directed, spine-like setae. Mandibles long and slender; with dorsal cutting edge overhanging ventral edge, left mandible deeply concave between cutting edges. Maxillae with palpifer and galea elongate; each palpus with basal two segments short, third elongate, fourth about one-third as long as third; labium with elongate mesal lobe, each palpus long and slender. Thoracic nota sclerotized; median ecdysial line absent; posterior margins of each notum partially recessed into the anterior margin of each succeeding notum. Pronotum with numerous primary setae and few secondary setae; lacking sulcus. Each propleuron fused to its trochantin which is elongate and narrow in lateral aspect but rather broad in dorsal view, and with prominent apico-dorsal notch. Meso- and metanota sclerotized, divided longitudinally on midline, with few secondary setae. Forelegs heavily sclerotized; each with coxa elongate, broad, bearing stout black setae apically. Mid- and hindlegs more lightly sclerotized than forelegs; coxae of midleg each bearing moderately stout black setae mesally. Hindlegs each with scattered setae on trochanter, femur, tibia, and tarsus modified into short, enlarged spines; claw slender and straight. Abdomen with only scattered primary setae; anal papillae present. Anal prolegs each with basal membranous section lacking setae; claw large, evenly curved and tapered, its ventral margin without teeth.

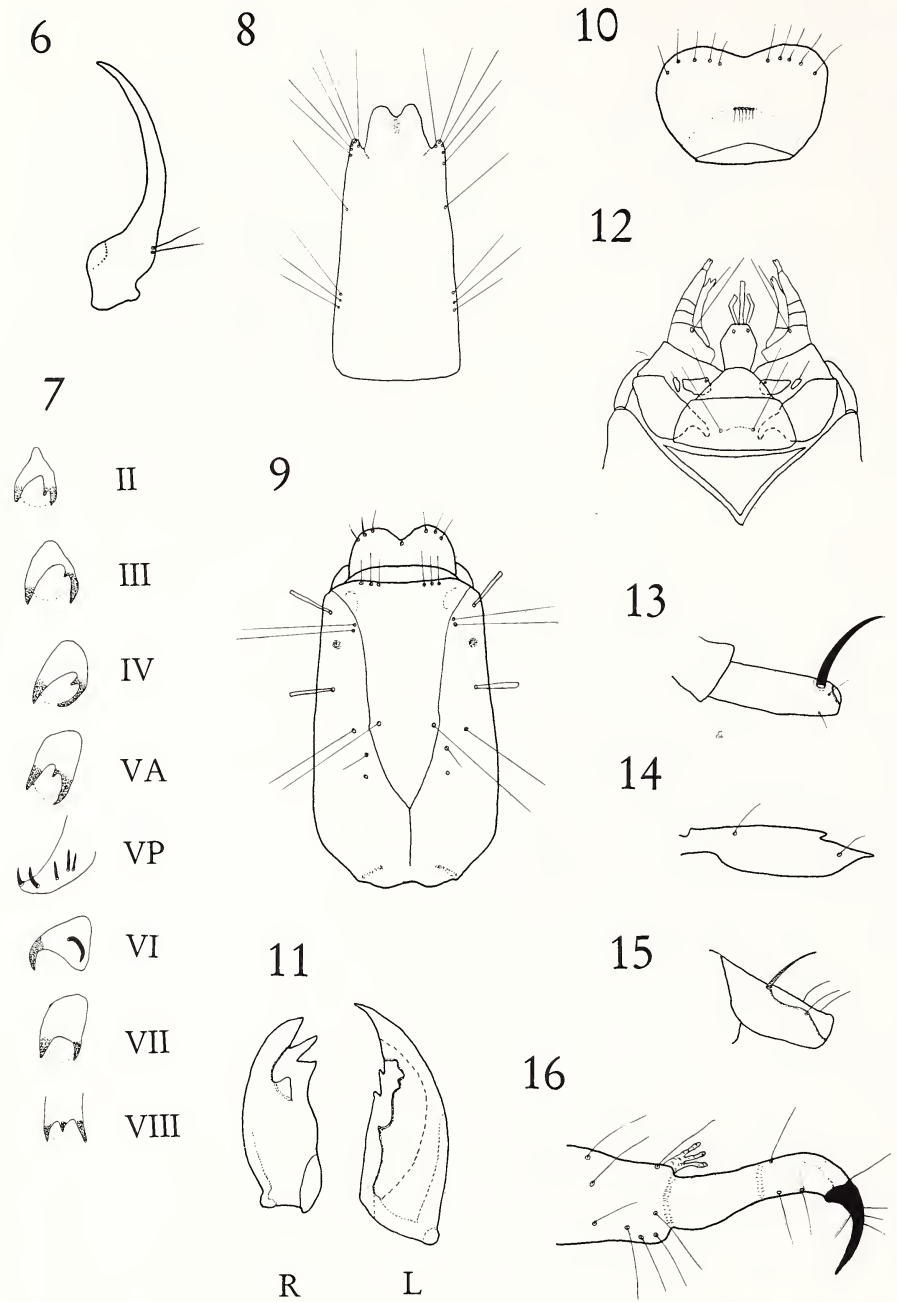
Holotype. Male, USA, Texas, Bandera Co., 1 mi N Medina, Hwy. 16, Medina River, 9 May 1992, D. E. Bowles, aspirated (NMNH).

Allotype. Female, same data as holotype, but 4 May 1992 (NMNH).

Paratypes. Same data as holotype, but 29 May 1991, aspirated, 1 male (ROM); 8 Jun 1991, aspirated, 1 female (ROM); 26 Apr 1992, aspirated, 1 female (NMNH); 4 May 1992, aspirated, 2 males (UMSP, INHS); 1 female (UMSP), 4 May 1992,



Figs. 1–16. *Austrotinodes texensis,* n. sp. Figs. 1–5. Adult. 1–4. Male gentitalia. 1. Ventral. 2. Left lateral. 3. Dorsal. 4. Phallus lateral. 5. Female genitalia, ventral. Figs. 6–8. Pupa. 6. Right mandible, dorsal. 7. Left pupal hook plates, dorsal (II–VIII = segment number, A =



anterior, P = posterior). 8. Apex of abdomen, dorsal. Figs. 9–16. Larva. 9. Head, dorsal. 10. Labrum, ventral. 11. Mandibles, ventral (R = right, L = left). 12. Head, ventral. 13. Coxa of right foreleg. 14. Right trochantin, lateral. 15. Coxa of right midleg. 16. Left anal proleg, lateral.

UV-light, 9 females (5—NMNH, 2—ROM, 2—TAMU); 9 May 1992, aspirated, 3 males (FSCA, NMNH, TAMU). Same data, but 3 mi NW Medina, 29 May 1991, UV-light, 1 female (CAS); 10 Jun 1991, UV-light, 6 females (FSCA); 26 Jun 1991, UV-light, 4 females (2—INHS, 2—TAMU). Real Co., Frio River, Leakey, 9 Jun 1994, R. Gorano, 2 males (CAS, UNT), 1 female (UNT). Val Verde Co., Del Rio, San Felipe Springs, 20 Apr 1992, D. E. Bowles, aspirated, 1 female (TAMU).

Other Material. Same data as holotype, but 9 May 1992, 1 larva (ROM), 27 Feb 1993, 1 larva (NMNH). Hays Co., Little Arkansas/Fern Bank springs, ca. 8 km E Wimberly, 11–14 August 1992, C. B. Barr, drift net, 1 pupa (NMNH).

Etymology. Named for the state of Texas to which this species appears to be endemic.

Remarks. *Austrotinodes texensis* is related to the species-groups of Central America and Mexico having the hindwings reduced in size with the corresponding loss of one anal vein, and the absence of ventral teeth on the anal claw of the larva (Flint 1973).

The new species is closely related to *Austrotinodes sedmani* Flint from Central America. However, males of *A. sedmani* from Panama that I examined showed the intermediate appendages in dorsal view were much broader distally, did not arch as abruptly as in the new species, and were more angular at midlength compared to the rounded condition observed in *A. texensis* (see Muñoz and Holzenthal, 1993, Fig. 5). Also, the inferior appendage in ventral view is considerably more robust in the new species, and the lateral margins of the ninth sternum in *A. sedmani* are relatively straight in comparison to the more sinuate margins in *A. texensis.*

A comparison of the female of the new species with the allotype female of *A. sedmani* also suggests they are closely related differing primarily in the shape of the eighth abdominal sternum. In *A. sedmani* this structure is small and is slightly wider than long, but in the new species the eighth sternum is considerably larger, being nearly 1.5 times long as wide.

Although the larva and pupa of the new species differ morphologically from those illustrated by Flint (1973), these lifestages are known for so few species in the genus that meaningful comparison is impossible.

BIOLOGICAL NOTES

The collection of the three larvae mentioned here (one by Waltz and McCafferty, 1983) are the only known larvae collected for the genus *Austrotinodes* in North America. Flint's (1973) larval description was based on prepupae that were collected from the undersides of rocks in a sandy, rocky stream in Chile. Flint suggested that, because of the odd stucture of the legs and the rather hairless appearance of the body, the larvae probably are tube-dwellers in the sand or gravel of the stream bottom or on rocks and large boulders. The larvae I collected were taken from deep pools (1.5–2.0 meters) of the Medina River where the substrate is coarse. The larvae were collected by digging deep into the substrate and then sifting the excavated materials. Extensive collecting in riffle areas did not yield any specimens. This suggests that Flint's proposal of a tube-dwelling larval form probably is correct. Nothing else is known about the biology of this species in the aquatic habitat.

Austrotinodes texensis appears to be endemic to the karst springs and/or spring-runs of the Edwards Plateau region of Texas (Bowles and Arsuffi, 1993). The Medina

Table 1. The species of *Austrotinodes,* including their geographic locations. Records are based on Schmid (1955), Flint (1973). Flint and Denning (1989), and Muñoz and Holzenthal (1993).

Species	Location
Austrotinodes amazonensis Flint and Denning, 1989	Brazil
A. ancylus Flint and Denning, 1989	Ecuador
A. angustior Schmid, 1955	Chile
A. ariasi Flint and Denning, 1989	Brazil
A. armiger Flint, 1983	Chile
A. bracteatus Flint and Denning, 1989	Brazil
A. brevis Schmid, 1989	Chile
A. canoabo Flint and Denning, 1989	Venezuela
A. cekalovici Flint, 1969	Chile
A. chihuahua Flint and Denning, 1989	Mexico
A. contubernalis Flint and Denning, 1989	Costa Rica, Panama
A. cubanus Kumanski, 1987	Cuba
A. doublesi Muñoz and Holzenthal, 1993	Costa Rica
A. fortunata Flint and Denning, 1989	Panama
A. freytagi Flint and Denning, 1989	Belize, Honduras
A. fuscomarginatus Flint and Denning, 1989	Venezuela
A. inbio Muñoz and Holzenthal, 1993	Costa Rica
A. irwini Flint, 1973	Chile
A. lineatus (Navas), 1934	Chile
A. mexicanus Flint, 1973	Mexico
A. neblinensis Flint and Denning, 1989	Venezuela
A. nielseni Flint and Denning, 1989	Argentina
A. panamensis Flint, 1973	Costa Rica, Panama
A. paraguayensis Flint, 1983	Brazil, Paraguay
A. picada Flint, 1983	Chile
A. prolixus Flint and Denning, 1989	Brazil
A. quadrispina Schmid, 1958	Chile
A. recta Schmid, 1964	Argentina, Chile
A. recurvatus Flint, 1983	Chile
A. sedmani Flint, 1973	Costa Rica, Panama, British Honduras, Guatemala
A. talcana (Navas), 1934	Chile
L. triangularis Schmid, 1958	Chile
A. texensis, new species	United States
A. tuxtlensis Flint and Denning, 1989	Mexico

River, the type locality, has its origin in several small springs in Bandera County, Texas, where it flows through the Texas Hill Country. The stream normally flows year round although the water level can drop appreciably during periods of little precipitation. Flow in the Medina River is swift over a coarse substrate. Few macrophytes are present but include watercress (*Rorippa nasturtium-aquaticum* (L.). Substrate ranges from cobble and gravel to limestone bedrock. The banks are lined with large bald cypress (*Taxodium distichium* (L.)) with Spanish and ball moss (*Til-*

landsia usneoides (L). and *T. recurvata* (L.), respectively). Numerous limestone outcroppings are present along the stream. The nearby Frio River, also a collection site for the new species, is similar in many respects to the Medina River. An analysis of the chemical composition and variability of the waters of the Frio and Medina rivers was presented by Groeger and Gustafson (1994). They found both streams had high specific conductance which is typical of streams flowing through the karst areas of the Edwards Plateau in Central Texas. The median specific conductance of the Medina River was 530 μS/cm while that of the Frio River was 400 μS/cm (Groeger and Gustafson, 1994). Both streams had high levels of Ca, Mg, and SO_4 indicating limestone weathering. The high ionic content of the Medina River also suggests an exposure of anhydrite and gypsum (Groeger and Gustafson, 1994).

The new species also was collected at San Felipe Springs in Val Verde County near the Rio Grande. These springs are the fourth largest springs in Texas with an average annual discharge of 2,600 L s^{-1} and have never been reported dry (Brune, 1981). The other collection site, Fern Bank Springs in Hays County, also have never been reported dry, but are considerably smaller than either the Medina River or San Felipe Springs. The flow of Fern Bank Springs varies, but usally does not exceed 140 L s^{-1}. These springs flow approximately 20 m before joining the Blanco River.

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